

Long Lake

Site Description

Location

Water designation number (WDN)	05-0009-00
Legal description	T117N-R55W-Sec. 11,12,13,14,22,23,24,25,26
County (ies)	Codington
Location from nearest town	3.0 miles north and 3.0 miles east of Henry, SD

Survey Dates and Sampling Information

Survey dates	August 1-2, 2013 (GN)
Gill net sets (n)	6

Morphometry

Watershed area (acres)	42,540
Surface area (acres)	≈2900
Maximum depth (ft)	≈16
Mean depth (ft)	unknown

Ownership and Public Access

Long Lake is a meandered lake owned by the State of South Dakota and the fishery is managed by the SDGFP. Public access is limited to a single primitive boat ramp (i.e., constructed using over-sized rock and gravel) located on the west shore or flooded road rights-of-way. A year-round boating restriction is in place on much of the north end of the lake (Figure 1). Lands adjacent to Long Lake are owned by the State of South Dakota and private individuals.

Watershed and Land Use

The 42,540 acre Long Lake sub-watershed (HUC-12) is located within the Lake Kampeska (HUC-10) watershed. Land use within the watershed is primarily agricultural including a mix of pasture or grassland, cropland, and scattered shelterbelts.

Water Level Observations

No Ordinary High Water Mark has been established by the South Dakota Water Management Board on Long Lake. On May 20, 2013 the elevation of Long Lake was 1722.2 fmsl. By October 8, 2013 the water level had decreased slightly to an elevation of 1721.8 fmsl.

Fish Management Information

Primary species	Walleye, Yellow Perch
Other species	Black Bullhead, Green Sunfish, Northern Pike, Orangespotted Sunfish; White Sucker
Lake-specific regulations	none
Management classification	none
Fish consumption advisories	Mercury: Walleye (> 17"). See the South Dakota Fishing Handbook for more details on meal and portion size recommendations. Also see Department of Health website: http://doh.sd.gov/Fish/Default.aspx for more information.

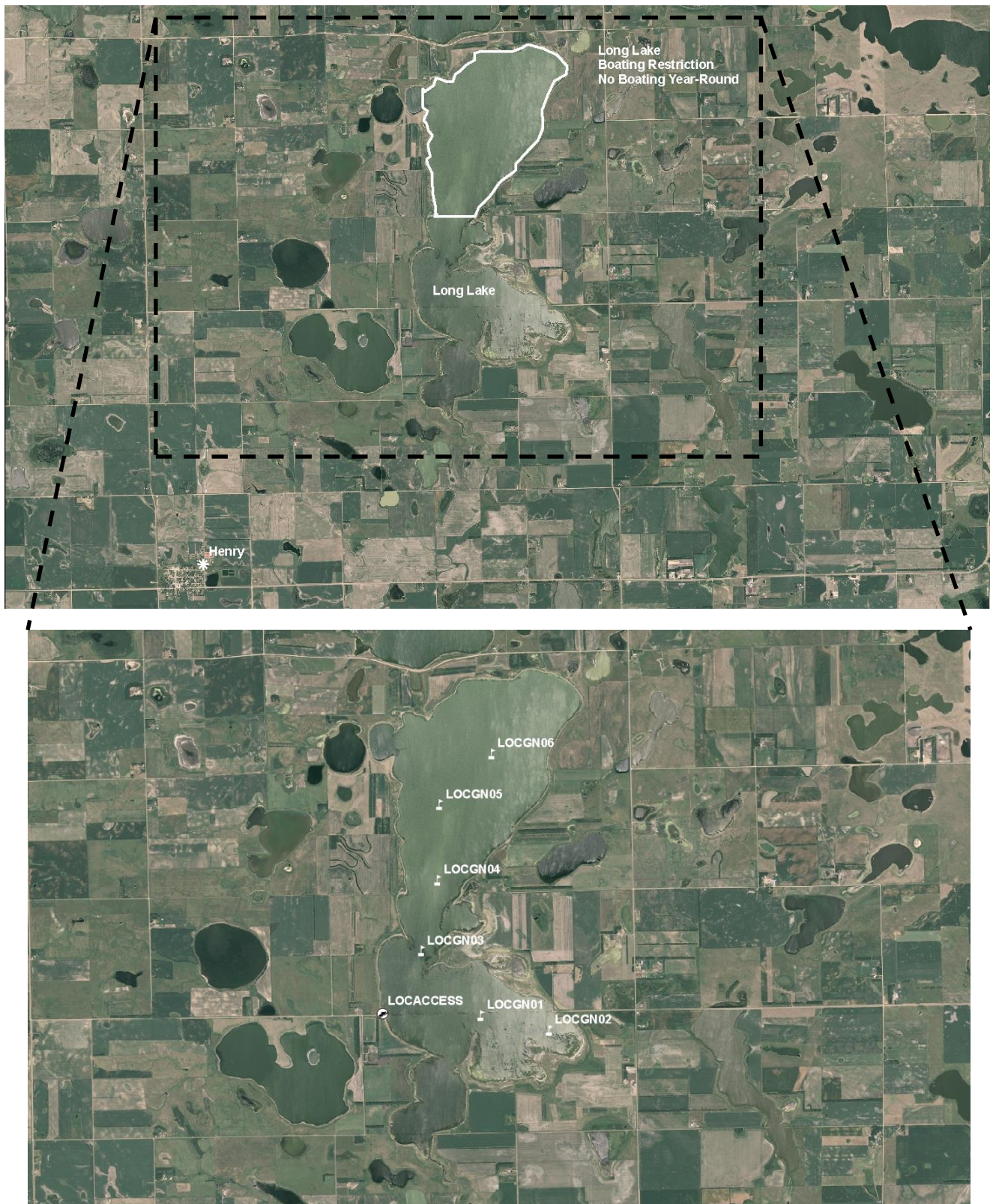


Figure 1. Map depicting geographic location of Long Lake (Codington County) from Henry, South Dakota (top). Also noted are boating closure boundaries (top) and standardized net locations (bottom) for Long Lake. LOCN= gill net

Management Objectives

- 1) Maintain a mean gill net CPUE of stock-length walleye ≥ 10 , a PSD of 30-60, and a PSD-P of 5-10.
- 2) Maintain a mean gill net CPUE of stock-length yellow perch ≥ 30 , a PSD of 30-60, and a PSD-P of 5-10.

Results and Discussion

Prior to the 1990s Long Lake was a shallow slough with limited sport fishery potential. However, above normal precipitation during the mid to late 1990s increased the surface area and depth of Long Lake diminishing the threat of winterkill and creating habitat capable of sustaining a sport fishery.

During the late 1990s, a quality-sized and highly abundant yellow perch population was discovered in Long Lake creating an initial “boom” in sport-fishing. Today, Long Lake remains a popular destination for anglers targeting both yellow perch and walleye.

Primary Species

Walleye: The mean gill net CPUE of stock-length Walleye was 32.0 (Table 1) and above the minimum objective (≥ 10 stock-length Walleye/net night; Table 3). The 2013 gill net CPUE represented an increase from the 2010 CPUE of 7.5 and indicated high relative abundance (Table 2).

Walleye in the gill net catch ranged in TL from 10 to 61 cm (3.9 to 24.0 in), had a PSD of 69 and a PSD-P of 7 (Table 1; Figure 2). The PSD was above the management objective of 30-60; while the PSD-P was within the objective range of 5-10 (Table 3).

Otoliths were collected from a sub-sample of gill net captured Walleye. Nine year classes (2001, 2006-2013) were present (Table 4). Natural reproduction contributes to the Walleye population in Long Lake; however in recent years the strongest years classes (i.e., 2010 and 2012) have coincided with fry stockings (Table 4; Table 6). The increased CPUE observed in 2013 can largely be attributed to recruitment of year classes produced in 2010 and 2012, which collectively comprised 77% of Walleye in the gill net catch (Table 2; Table 4). It should be noted that the contribution of stocked or naturally-produced Walleye to the 2010 and 2012 year classes is unknown, as stocked fry were unmarked making it difficult to differentiate stocked from naturally-produced walleye. The capture of 15 individuals from the 2013 (age-0) year class indicates successful natural reproduction; however, recruitment of this cohort is currently unknown and will be assessed in future surveys.

Growth rates appear to be fast with the weighted mean TL at capture of age-2 and age-3 Walleye being 412 and 478 mm (16.2 and 18.8 in), respectively (Table 5). Mean W_r values of Walleye in the gill net catch ranged from 99 to 100 for all length

categories (e.g., stock to quality) sampled, with the mean W_r of stock-length Walleye being 100 (Table 1). No length-related trends in condition were apparent.

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 65.2 (Table 1) and above the minimum objective (≥ 30 stock-length Yellow Perch/net night; Table 3). The 2013 gill net CPUE was lower than the 2010 CPUE of 154.3 (Table 2), but still indicated high relative abundance.

Gill net captured Yellow Perch ranged in TL from 10 to 29 cm (3.9 to 11.4 in), had a PSD of 18, and a PSD-P of 4. Both the PSD and PSD-P were below the objective ranges of 30-60 and 5-10 indicating a population skewed toward smaller individuals (Table 1; Figure 3).

Otoliths were collected from a sub-sample of gill net captured yellow perch. Age structure information indicated consistent yellow perch recruitment with three consecutive year classes (2010-2012) being present (Table 7). The 2012 cohort was the most represented and comprised 82% of Yellow Perch in the gill net catch (Table 7).

The weighted mean TL at capture for age-1 male Yellow Perch was 131 mm (5.2 in; Table 8). Few males older than age-1 were captured (Table 8). The weighted mean TL at capture for age-1, age-2, and age-3 female Yellow Perch was 146, 224, and 277 mm (5.7, 8.8 and 10.9 in), respectively (Table 8). Mean W_r values of gill net captured Yellow Perch ranged from 97 to 104 for all length categories (e.g., stock to quality) sampled and no length-related trends in condition were apparent. The mean W_r of stock-length Yellow Perch was 102 (Table 1).

Other Species

Other: Orangespotted sunfish and white sucker were other fish species captured in relatively low numbers during the 2013 fish community survey (Table 1).

Management Recommendations

- 1) Conduct fish community surveys utilizing gill nets on an every third year basis (next survey scheduled in summer 2016) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Collect otoliths from walleye and yellow perch to assess age structure and growth rates of each population.
- 3) Stock walleye (≈ 500 fry/acre) on a biennial basis to establish additional year classes, provided water levels are sufficient.
- 4) Monitor winter and summer kill events. In cases of substantial winter/summer kill the need to re-establish a fishery in Long Lake should be evaluated. If water levels are sufficient; Walleye and Yellow Perch should be stocked to re-establish a fish community.

Table 1. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length fish (PSD-P), and mean relative weight (Wr) of stock-length fish for various fish species captured in experimental gill nets from Long Lake, 2013. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). OSF= Orangespotted Sunfish; WAE= Walleye; WHS= White Sucker; YEP= Yellow Perch

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
<i>Gill nets</i>								
OSF [†]	0.2	0.2	---	---	---	---	---	---
WAE	32.0	9.4	69	6	7	3	100	<1
WHS	0.8	0.5	100	0	100	0	104	4
YEP	65.2	11.8	18	3	4	2	102	<1

[†] All fish sizes

Table 2. Historic mean catch rate (CPUE; catch/net night) of stock-length fish for various fish species captured experimental gill nets from Long Lake, 2010-2013. GSF= Green Sunfish; OSF= Orangespotted Sunfish; WAE= Walleye; WHS= White Sucker; YEP= Yellow Perch

Species	CPUE			
	2010	2011	2012	2013
<i>Gill nets</i>				
GSF	1.7	---	---	0.0
OSF [†]	7.3	---	---	0.2
WAE	7.5	---	---	32.0
WHS	0.0	---	---	0.8
YEP	154.3	---	---	65.2

Table 3. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) for selected species captured in experimental gill nets from Long Lake, 2010-2013. WAE = Walleye; YEP = Yellow Perch

Species	2010	2011	2012	2013	Objective
<i>Gill nets</i>					
WAE					
CPUE	8	---	---	32	≥ 10
PSD	47	---	---	69	30-60
PSD-P	16	---	---	7	5-10
Wr	98	---	---	100	---
YEP					
CPUE	154	---	---	65	≥ 30
PSD	16	---	---	18	30-60
PSD-P	2	---	---	4	5-10
Wr	98	---	---	102	---

Table 4. Year class distribution based on the expanded age/length summary for Walleye sampled in gill nets and associated stocking history (# stocked x 1000) from Long Lake, 2010-2013.

	Year Class												
Survey Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
2013	15	59	22	99	4	3	2	1					1
2010	---	---	---	341	24	1	3	8	4	1		1	3
# stocked													
fry		1100		1500									
small fingerling													
large fingerling													

Table 5. Weighted mean total length (mm) at capture for Walleye age-0 through age-9 captured in experimental gill nets (expanded sample size) from Long Lake, 2010-2013. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	Age									
	0	1	2	3	4	5	6	7	8	9
2013	123(15)	298(59)	412(22)	478(99)	524(4)	523(3)	570(2)	615(1)	---	---
2010	133(341)	327(24)	430(1)	446(3)	470(8)	508(4)	546(1)	---	535(1)	629(3)

[†] Older Walleye were sampled, but are not reported in this table

Table 6. Stocking history including size and number for fishes stocked into Long Lake, 2001-2013. WAE= Walleye

Year	Species	Size	Number
2010	WAE	fry	1,500,000
2012	WAE	fry	1,100,000

Table 7. Year class distribution based on expanded age/length summary for Yellow Perch sampled in gill nets from Long Lake, 2010-2013.

Survey Year	Year Class						
	2013	2012	2011	2010	2009	2008	2007
2013		353	57	18			
2010	---	---	---	440	892	15	21

Table 8. Weighted mean total length (mm) at capture by gender for Yellow Perch captured in experimental gill nets (expanded sample size) from Long Lake, 2010-2013. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	Age			
	0	1	2	3
2013				
Male	---	131 (36)	193 (3)	---
Female	---	146 (317)	224 (54)	277 (18)
Combined	---	145 (353)	223 (57)	277 (18)
2010				
Male	95 (192)	173 (130)	260 (2)	---
Female	96 (128)	186 (716)	209 (17)	296 (21)
Combined	95 (440)	184 (892)	216 (15)	296 (21)

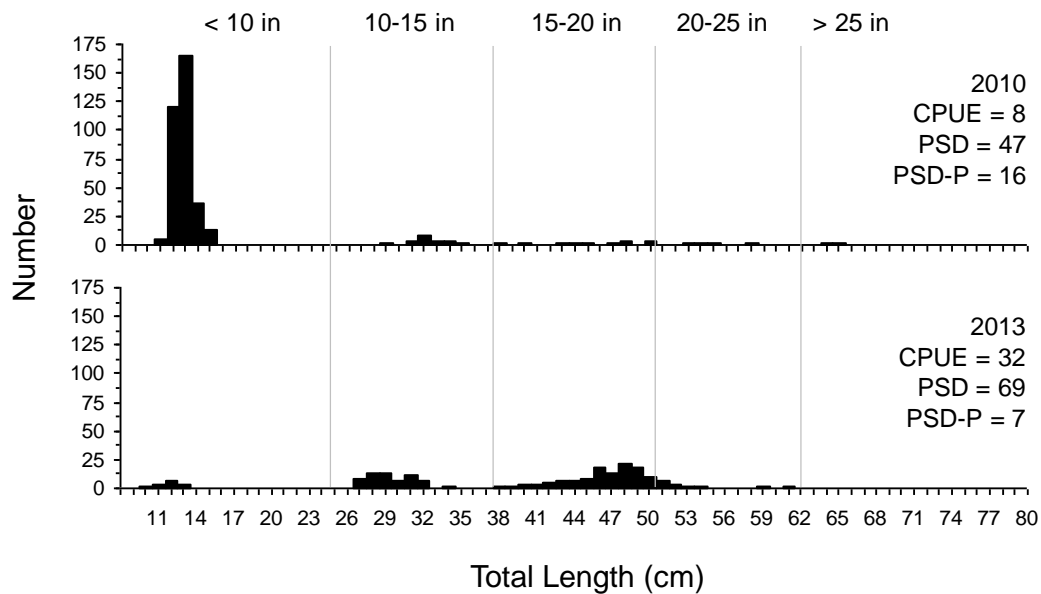


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in Long Lake, 2010-2013.

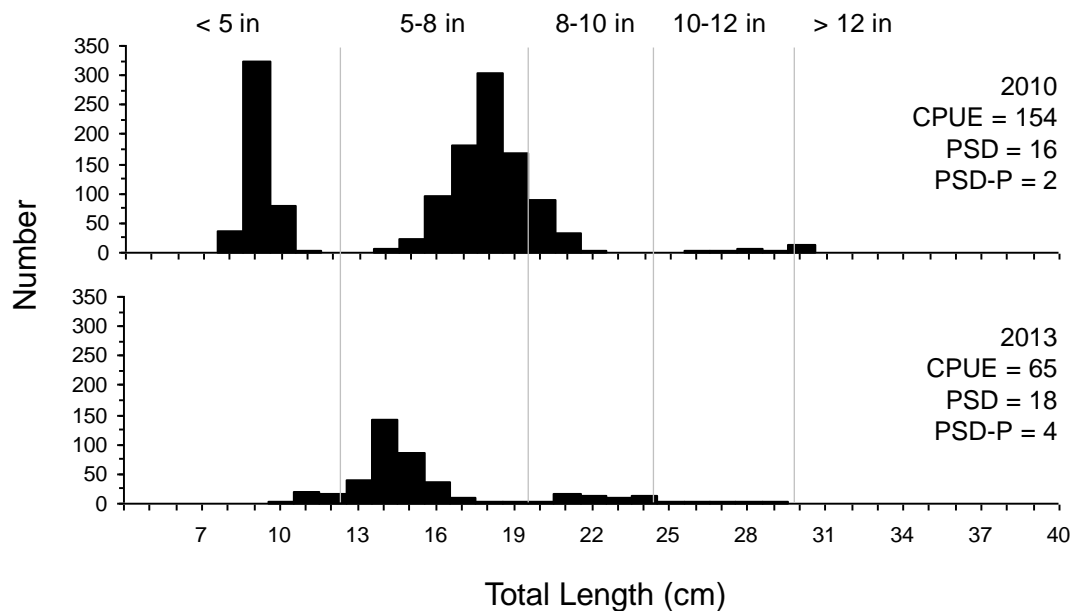


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